

CLAIMS

What is claimed is:

- 5 1. A router supporting Mobile IP for use with a mobile node which registers with the router, the router comprising:
- a memory; and
- a processor coupled to the memory,
- wherein at least one of the memory and the processor are adapted to provide:
- 10 (a) a mobility binding table having an entry associated with at least one mobile node that has registered with a Home Agent of the router, wherein the entry in the mobility binding table identifies a care-of address associated with the at least one mobile node; and
- (b) a visitor table that lists addresses of all mobile nodes being serviced by a Foreign Agent of the router, the mobile nodes including the at least one mobile node that
- 15 has registered with the Home Agent of the router.
2. The router as recited in claim 1, wherein the care-of address is a foreign agent address or a collocated care-of address.
- 20 3. The router as recited in claim 1, wherein the interface field in the routing table identifies a physical interface on the router.
4. The router as recited in claim 1, wherein the routing table is created without specifying tunnel interfaces to reach the mobile nodes.

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5. The router as recited in claim 1, wherein the next hop field in the routing table specifies a home address associated with one of the mobile nodes.

6. The router as recited in claim 1, wherein the mobility binding table further includes a physical interface field associated with the at least one mobile node, the physical interface field specifying a physical interface on the router.

7. The router as recited in claim 1, wherein the mobility binding table is created without specifying a tunnel interface to reach the at least one mobile node.

8. The router as recited in claim 1, wherein the visitor table is created without specifying a tunnel interface to reach the Home Agent associated with one of the mobile nodes.

9. A router supporting Mobile IP that enables intra-agent mobility by a mobile node, the router comprising:

a Home Agent having a routing table including an entry for the mobile node to enable the Home Agent to forward a packet to the mobile node and a mobility binding table associating the mobile node with a care-of address upon registration with the Home Agent; and

a Foreign Agent having a visitor table that lists an address of the mobile node to indicate that the mobile node has roamed to the Foreign Agent and is being serviced by the Foreign Agent.

10. The router as recited in claim 9, wherein the router enables the mobile node to roam to the Foreign Agent and receive packets addressed to the mobile node via the Home Agent after registering with the Home Agent.

11. The router as recited in claim 9, wherein the care-of address is a foreign agent address or a collocated care-of address.

5 12. The router as recited in claim 9, wherein the Home Agent is on a first interface of the router and the Foreign Agent is on a second interface of the router.

10 13. The router as recited in claim 9, wherein the routing table includes a physical interface field associated with the mobile node that specifies a physical interface on the router.

14. The router as recited in claim 9, wherein the routing table is created without specifying a tunnel interface to reach the mobile node.

15 15. The router as recited in claim 9, wherein the routing table includes a next hop field specifying a home address associated with the mobile node.

16. The router as recited in claim 9, wherein the mobility binding table includes a physical interface on the router associated with the mobile node.

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17. The router as recited in claim 9, wherein the mobility binding table is created without specifying a tunnel interface to reach the mobile node.

25 18. The router as recited in claim 9, wherein the visitor table is created without specifying a tunnel interface to reach the Home Agent.

19. A router supporting Mobile IP for use with a mobile node which registers with the router, the router comprising:

a memory; and

a processor coupled to the memory,

5 wherein at least one of the memory and the processor are adapted to provide a routing table having an entry for one or more mobile nodes, a next hop field associated with each of the mobile nodes, and an interface field associated with the next hop field, the routing table enabling the router to forward a packet sent to one of the mobile nodes to a node identified by the next hop field via a link specified in the interface field, wherein the
10 interface field in the routing table specifies a physical interface on the router, thereby enabling a packet to be forwarded via the physical interface on the router.

20. The router as recited in claim 19, wherein the routing table is created without specifying tunnel interfaces to reach the mobile nodes.

15 21. The router as recited in claim 19, wherein the next hop field in the routing table specifies a home address associated with one of the mobile nodes.

22. A router supporting Mobile IP for use with a mobile node which registers with the
20 router, the router comprising:

a memory; and

a processor coupled to the memory,

25 wherein the memory and the processor are adapted to provide a mobility binding table having an entry associated with at least one mobile node that has registered with the router, wherein the entry in the mobility binding table identifies a care-of address associated with the at least one mobile node and a physical interface on the router, the physical interface being associated with the at least one mobile node.

23. The router as recited in claim 22, wherein the mobility binding table is created without specifying a tunnel interface to reach the at least one mobile node.

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24. The router as recited in claim 23, wherein the care-of address is a foreign agent address.

25. A router supporting Mobile IP for use with a mobile node which registers with the router, the router comprising:

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a memory; and

a processor coupled to the memory,

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wherein at least one of the memory and the processor are adapted to provide a visitor table that lists addresses of all mobile nodes being serviced by the router and lists physical interfaces on the router for one or more of the mobile nodes without specifying a tunnel interface to reach a Home Agent associated with the one or more of the mobile nodes such that the visitor table does not specify a tunnel interface for all the mobile nodes supported by the router.

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26. In a router supporting Mobile IP, a method of registering a mobile node visiting a Foreign Agent with a Home Agent, the method comprising:

receiving a registration request packet from the mobile node;

determining from the registration request packet whether the router includes the Foreign Agent the mobile node is visiting;

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determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering; and

if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering, registering the mobile node with the Home Agent of the router.

27. The method as recited in claim 26, wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node.

5 28. The method as recited in claim 26, wherein registering the mobile node is performed without creating a tunnel interface to reach the Home Agent.

29. The method as recited in claim 26, further comprising:

10 forwarding the registration request packet to the Home Agent if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router.

30. In a router supporting Mobile IP, a method of registering a mobile node visiting a Foreign Agent with a Home Agent, the method comprising:

15 receiving a registration request packet, the registration request packet specifying a Home Address and a care-of address;

determining from the registration request packet whether the router includes the Foreign Agent and the Home Agent; and

20 if it is determined that the router includes the Foreign Agent and the Home Agent, registering the mobile node with the Home Agent such that the care-of address and a physical interface are associated with the mobile node, thereby enabling packets addressed to the mobile node to be forwarded by the Home Agent of the router to the Foreign Agent of the router via the physical interface.

25 31. The method as recited in claim 30, wherein determining comprises:

ascertaining whether the router includes a Foreign Agent associated with the care-of address; and

ascertaining whether the router includes a Home Agent associated with the Home

Address.

5 32. In a router including a Home Agent having a Home Agent address and a Foreign Agent advertising a Foreign Agent address, the router supporting Mobile IP, a method of registering a mobile node visiting the Foreign Agent with the Home Agent, the method comprising:

10 receiving a registration request packet, the registration request packet specifying a Home Address and a care-of address, wherein the Home Address specified in the registration request packet is used to identify the Home Agent address associated with the router and the care-of address specified in the registration request packet is equivalent to the Foreign Agent address advertised by the router; and

registering the mobile node visiting the Foreign Agent of the router with the Home Agent of the router.

15 33. The method as recited in claim 32, wherein registering the mobile node includes:

updating a routing table with a physical interface on the router to enable the router to forward a packet to the mobile node via the physical interface.

20 34. The method as recited in claim 33, wherein updating the routing table is performed without creating or specifying a tunnel interface to reach the mobile node.

35. The method as recited in claim 32, wherein registering the mobile node includes:

25 updating a mobility binding table of the Home Agent with a care-of address associated with the mobile node and a physical interface associated with the mobile node to indicate that the mobile node has registered with the Home Agent via the care-of address, the physical interface being an interface on the router.

36. The method as recited in claim 35, wherein updating the mobility binding table is

performed without creating or specifying a tunnel interface to reach the mobile node.

5 37. The method as recited in claim 32, wherein registering the mobile node includes updating a visitor table of the Foreign Agent to include an address of the mobile node to indicate that the mobile node is being serviced by the Foreign Agent and an associated physical interface on the router without creating or specifying a tunnel interface to reach the Home Agent.

10 38. The method as recited in claim 32, further including:
receiving a packet addressed to the mobile node from a corresponding node; and
forwarding the packet to the mobile node via a physical interface on the router.

15 39. The method as recited in claim 38, wherein forwarding the packet is performed without encapsulating or tunneling the packet.

40. The method as recited in claim 38, wherein forwarding the packet is performed without creating a tunnel interface.

20 41. The router as recited in claim 1, wherein the Home Agent is associated with a first interface of the router and the Foreign Agent is associated with a second interface of the router.

25 42. The router as recited in claim 41, wherein the first interface is the second interface.

43. The router as recited in claim 41, wherein the first interface is different from the second interface.

44. A computer-readable medium storing thereon computer-readable instructions for registering a mobile node visiting a Foreign Agent with a Home Agent in a router supporting Mobile IP, comprising:

5 instructions for receiving a registration request packet, the registration request packet specifying a Home Address and a care-of address;

instructions for determining from the registration request packet whether the router includes the Foreign Agent and the Home Agent; and

10 instructions for registering the mobile node with the Home Agent such that the care-of address and a physical interface are associated with the mobile node if it is determined that the router includes the Foreign Agent and the Home Agent, thereby enabling packets addressed to the mobile node to be forwarded by the Home Agent of the router to the Foreign Agent of the router via the physical interface.

15 45. A router supporting Mobile IP and adapted for registering a mobile node visiting a Foreign Agent with a Home Agent, comprising:

means for receiving a registration request packet, the registration request packet specifying a Home Address and a care-of address;

20 means for determining from the registration request packet whether the router includes the Foreign Agent and the Home Agent; and

25 means for registering the mobile node with the Home Agent such that the care-of address and a physical interface are associated with the mobile node if it is determined that the router includes the Foreign Agent and the Home Agent, thereby enabling packets addressed to the mobile node to be forwarded by the Home Agent of the router to the Foreign Agent of the router via the physical interface.

30 46. A computer-readable medium storing thereon computer-readable instructions for registering a mobile node visiting a Foreign Agent with a Home Agent in a router supporting Mobile IP, comprising:

instructions for receiving a registration request packet from the mobile node;

instructions for determining from the registration request packet whether the router includes the Foreign Agent the mobile node is visiting;

5 instructions for determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering; and

instructions for registering the mobile node with the Home Agent of the router if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering,.

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47. The computer-readable medium as recited in claim 46, wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node.

15 48. The computer-readable medium as recited in claim 46, wherein registering the mobile node is performed without creating a tunnel interface to reach the Home Agent.

49. The computer-readable medium as recited in claim 46, further comprising:
instructions for forwarding the registration request packet to the Home Agent if it
20 is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router.

50. A router supporting Mobile IP adapted for registering a mobile node visiting a Foreign Agent with a Home Agent, comprising:

25 means for receiving a registration request packet from the mobile node;

means for determining from the registration request packet whether the router includes the Foreign Agent the mobile node is visiting;

means for determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering; and

means for registering the mobile node with the Home Agent of the router if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering.

5 51. The router as recited in claim 50, wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node.

10 52. The router as recited in claim 50, wherein registering the mobile node is performed without creating a tunnel interface to reach the Home Agent.

53. The router as recited in claim 50, further comprising:
means for forwarding the registration request packet to the Home Agent if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router.
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54. A router supporting Mobile IP adapted for registering a mobile node visiting a Foreign Agent with a Home Agent, comprising:

a processor; and

20 a memory, at least one of the processor and the memory being adapted for:

receiving a registration request packet from the mobile node;

determining from the registration request packet whether the router includes the Foreign Agent the mobile node is visiting;

25 determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering; and

if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering, registering the mobile node with the Home Agent of the router.

55. The router as recited in claim 54, wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node.

5 56. The router as recited in claim 54, wherein registering the mobile node is performed without creating a tunnel interface to reach the Home Agent.

57. The router as recited in claim 54, wherein at least one of the processor and the memory are further adapted for:

10 forwarding the registration request packet to the Home Agent if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router.

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